

### **ABSTRACT OF THE DISCLOSURE**

Nanotubes of transition metal chalcogenides as long as 0.2-20 microns or more, perfect in shape and of high crystallinity, are synthesized from a transition metal material, e.g. the transition metal itself or a substance comprising a transition metal such as an oxide, water vapor and a  $H_2X$  gas or  $H_2$  gas and X vapor, wherein X is S, Se or Te, by a two-step or three-step method. The transition metal chalcogenide is preferably  $WS_2$  or  $WSe_2$ . Tips for scanning probe microscopy can be prepared from said long transition metal chalcogenide nanotubes.